

WHAT IS CLAIMED IS:

- 1 1. An apparatus for controlling fluid flow, comprising:  
2 a first hollow body portion extending along a longitudinal axis of the apparatus;  
3 a second hollow body portion extending along the longitudinal axis; and  
4 an internal duct extending along the longitudinal axis, the duct being formed from a  
5 pliable membrane, the duct being attached to the first body portion at a first duct location, and  
6 the duct being attached to the second body portion at a second duct location, wherein the first  
7 body portion and the first duct location are adapted to pivot about the longitudinal axis relative to  
8 the second body portion and the second duct location for twisting and untwisting the duct.
- 1 2. The apparatus of claim 1, wherein the first body portion is adjacent the second body  
2 portion along the longitudinal axis.
- 1 3. The apparatus of claim 1, further comprising an intermediate body portion located  
2 between the first body portion and the second body portion along the longitudinal axis.
- 1 4. The apparatus of claim 1, at least part of the duct being located in at least part of the first  
2 and second body portions.
- 1 5. The apparatus of claim 1, wherein the first body portion has a generally cylindrically-  
2 shaped tubular interior surface, and wherein the second body portion has a generally  
3 cylindrically-shaped tubular interior surface
- 1 6. The apparatus of claim 1, further comprising a bearing, wherein the first body portion is  
2 pivotably attached to the second body portion via the bearing.

- 1 7. The apparatus of claim 1, further comprising a rod being in contact with the duct and  
2 extending generally along the longitudinal axis.
- 1 8. The apparatus of claim 7, wherein the rod is substantially parallel with the longitudinal  
2 axis when the duct is in a fully open position, and such that the rod is slanted at an acute angle  
3 relative to the longitudinal axis when the duct is at least partially twisted.
- 1 9. The apparatus of claim 7, wherein the rod is slanted at an acute angle relative to the  
2 longitudinal axis when the duct is in a fully open position.
- 1 10. The apparatus of claim 7, further comprising additional rods, the additional rods being  
2 distributed about the circumference of the duct and extending generally along the longitudinal  
3 axis.
- 1 11. The apparatus of claim 7, wherein at least part of the rod is flexible.
- 1 12. The apparatus of claim 7, wherein at least part of the rod is rigid.
- 1 13. The apparatus of claim 7, wherein at least part of the rod has a cross-sectional shape  
2 selected from a group consisting of circular, elliptical, oval, rectangular, square, triangular,  
3 rectangular with rounded corners, rounded, curved, and arbitrarily shaped.
- 1 14. The apparatus of claim 7, wherein the rod is embedded in the membrane of the duct.
- 1 15. The apparatus of claim 7, wherein at least part of the rod is affixed to the membrane of  
2 the duct.

- 1 16. The apparatus of claim 15, wherein the rod is attached to an exterior surface of the duct.
- 1 17. The apparatus of claim 15, wherein the rod is attached to an interior surface of the duct.
- 1 18. The apparatus of claim 1, further comprising a spring biased upon the first body portion.
- 1 19. The apparatus of claim 1, further comprising a spring biased upon the second body  
2 portion.
- 1 20. The apparatus of claim 1, further comprising:  
2 a gear portion extending from an exterior of the first body portion.

1 21. An apparatus for controlling fluid flow, comprising:  
2 a first hollow body portion extending along a longitudinal axis of the apparatus;  
3 a second hollow body portion extending along the longitudinal axis;  
4 an internal duct extending along the longitudinal axis, the duct being formed from a  
5 pliable membrane, the duct being attached to the first body portion at a first duct location, and  
6 the duct being attached to the second body portion at a second duct location, wherein the first  
7 body portion and the first duct location are adapted to pivot about the longitudinal axis relative to  
8 the second body portion and the second duct location for twisting and untwisting the duct; and  
9 a rod being in contact with the duct and extending generally along the longitudinal axis.

1 22. The apparatus of claim 21, wherein the rod is substantially parallel with the longitudinal  
2 axis when the duct is in a fully open position, and such that the rod is slanted at an acute angle  
3 relative to the longitudinal axis when the duct is at least partially twisted.

1 23. The apparatus of claim 21, wherein the rod is slanted at an acute angle relative to the  
2 longitudinal axis when the duct is in a fully open position.

1 24. The apparatus of claim 21, further comprising additional rods, the additional rods being  
2 distributed about the circumference of the duct and extending generally along the longitudinal  
3 axis.

1 25. The apparatus of claim 21, wherein at least part of the rod is flexible.

1 26. The apparatus of claim 21, wherein at least part of the rod is rigid.

1 27. The apparatus of claim 21, wherein at least part of the rod has a cross-sectional shape  
2 selected from a group consisting of circular, elliptical, oval, rectangular, square, triangular,  
3 rectangular with rounded corners, rounded, curved, and arbitrarily shaped.

1 28. The apparatus of claim 21, wherein the rod is embedded in the membrane of the duct.

1 29. The apparatus of claim 21, wherein at least part of the rod is affixed to the membrane of  
2 the duct.

1 30. An apparatus for controlling fluid flow, comprising:  
2 a first hollow body portion extending along a longitudinal axis of the apparatus;  
3 a second hollow body portion extending along the longitudinal axis, wherein the second  
4 body portion is adjacent to the first body portion along the longitudinal axis; and  
5 an internal duct extending along the longitudinal axis, the duct being formed from a  
6 pliable membrane, at least part of the duct being located in at least part of the first and second  
7 body portions, the duct having a first duct end attached to the first body portion, and the duct  
8 having a second duct end attached to the second body portion, wherein the first body portion and  
9 the first duct end are adapted to pivot about the longitudinal axis relative to the second body  
10 portion and the second duct end for twisting and untwisting the duct.

1 31. A method of controlling fluid flow, comprising:  
2 providing an apparatus comprising  
3 a first hollow body portion extending along a longitudinal axis of the apparatus,  
4 a second hollow body portion extending along the longitudinal axis, and  
5 an internal duct extending along the longitudinal axis, the duct being formed from  
6 a pliable membrane, the duct being attached to the first body portion at a first duct location, and  
7 the duct being attached to the second body portion at a second duct location;  
8 allowing fluid to flow at a first flow rate through the apparatus via the duct when the duct  
9 is untwisted; and  
10 restricting fluid flow through the duct to a second flow rate when the duct is at least  
11 partially twisted, wherein the second flow rate is less than the first flow rate.

1 32. The apparatus of claim 31, wherein the apparatus further comprises a rod that is in  
2 contact with the duct and extends generally along the longitudinal axis, and further comprising:  
3 supporting the duct with the rod.

1    33.    An engine system comprising:  
2            an apparatus for controlling fluid flow, the apparatus comprising  
3                    a first hollow body portion extending along a longitudinal axis of the apparatus;  
4                    a second hollow body portion extending along the longitudinal axis; and  
5                    an internal duct extending along the longitudinal axis, the duct being formed from  
6    a pliable membrane, the duct being attached to the first body portion at a first duct location, and  
7    the duct being attached to the second body portion at a second duct location, wherein the first  
8    body portion and the first duct location are adapted to pivot about the longitudinal axis relative to  
9    the second body portion and the second duct location for twisting and untwisting the duct.